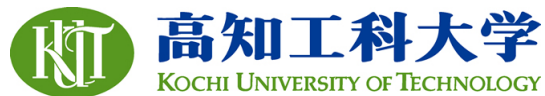


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Dynamics of control mechanisms in a cost plus percentage contract

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ABSTRACT: While the control mechanisms of incentive contracts have been widely studied, this study attempts to determine the optimal control over a cost-plus percentage contract of a construction project. Cost-plus percentage contract shifts some risk from the contractor to client, thus offering little incentive for the contractor to control costs. The owner requires additional management over the construction project to ensure that only necessary costs are spent. The data are collected through documentation and interviews with both the owner and contractor. Empirical results indicate that multiple control mechanisms are necessary to manage properly the total cost of the projects. The owner cannot rely entirely on the contractor to control costs in a cost-plus percentage contract.

KEYWORDS: Cost-plus contracts, cost control, risk evaluation

1. INTRODUCTION

Business relationships are seldom based entirely on trust. Even in trust-based collaborative settings (e.g., partnering arrangements) the client still uses control mechanisms to ensure that contractors behave trustworthily (Badenfelt, 2010). Client does not have access to the same information as the contractor. The information asymmetry creates the potential of mistrust (Muller and Turner, 2005). As control is pervasive in construction projects, managing projects through various planning and control tools is viewed as bureaucratization, which increases control over individuals, teams, and organizations through ideologies efficiency and performance (Tuuli, *et al.*, 2010). Previously developed control mechanisms for incentive contracts had limitations to fully apply to cost plus percentage contract.

As is generally assumed, cost-plus percentage contracts shift a certain amount risk from a contractor to client, thus offers little incentive for a

contractor to control costs. . A client thus requires additional management over a construction project to ensure that only necessary costs are spent. Turner and Simister (2001) suggest cost-plus percentage contracts are used where uncertainty of both product and process is high. A client or government adopts this contract when designs are not finalized. Both contracting parties cannot agree on a fixed price, and construction must start immediately, followed by implementation of cost-plus contracts. This type of contract is useful after natural disaster which government needs to start rebuild the disaster area immediately without complete designs. Government select just one contractor should use cost plus contracts (McAfee and McMillan, 1986). The cost plus contracts total costs may be under than incentive contracts (Hiller and Tollison, 1978). Thus, cost-plus percentage contracts are important contract type for government to use during emergency crisis.

1.1 Objectives

Despite the consider attention paid recently in

empirical studies to control mechanisms in incentive contracts for construction projects, the role of control in cost-plus percentage contracts has seldom been addressed. This study elucidates the dynamics of control in a cost-plus percentage contract, by examining to what extent control mechanisms in a control portfolio are used and how such control is exercised. This objective is achieved based on a case study involving a housing construction project.

2. LITERATURE REVIEW

Control mechanisms

Control systems have been conceptualized and categorized in various ways, with formal and informal control as the two main categories (Langfield-Smith and Smith, 2003). Formal control is designed explicitly to monitor the results, while informal control is designed implicitly. Formal control attempts to restrict behaviors or outcomes, while informal control mechanisms depicted as self-control (Tuuli *et al.*, 2010). Evaluating behavior ensures the feasibility of the process, while evaluating outcomes rely only on assessing the performance of member accurately and reliably, such as in policies, procedures, or reports. Informal control is exercised when organizations fail to specify task-related behaviors and output. Instead, informal control focuses on developing shared values, beliefs, and goals among members (Das and Teng, 2001).

Cost-plus contract

As is well known, cost-plus contracts allow for implementation of a fast track construction cycle, because building specifications and drawings do not need to be completed before construction commences. However, a client is limited in that these contracts tend to increase construction costs, as they provide less motivation for the contractor to work efficiently and minimize costs than fixed-price

contracts do (Rosenfeld and Geltner, 1991). The ability to allow for permit construction to begin earlier is often highly prioritized, owing to its ability to contribute to a shorter construction period. Clients can reduce the cost of interest if the construction is completed earlier. The building can start operating earlier, which is another benefit for clients. While the ability to complete a project in a timely manner is obviously a valuable economic benefit, the possibility of increase construction costs is often unaware if the construction project is delayed. Cost-plus contracts are often used when designs are finalized, both contracting parties cannot agree on a fixed-price, and construction must start immediately. Cost-plus contracts vary in form. This study focuses on the cost-plus percentage of costs. Cost-plus percentage contract is an agreement on a construction project in which the contractor is provided a specified percentage profit over and above the actual construction costs (Friedman, 2007). A contractor thus gains higher profits when the actual costs of construction are higher.

3. METHODOLOGY

While focusing on how control manifests itself from interpretive and explorative perspectives, this study adopts qualitative research design methods and a case study as an in-depth research procedure (Yin, 2009). The case study is based on a completed housing construction project. The data are based on reconstructions of the process involved between client and contractor.

3.1 Method

The empirical data was collected through interviews, documentary analysis and observations. The primary data sources are interviews with clients and contractor key personnel. Although unstructured, all interviews were taped and lasted approximately two hours. Other data were collected through documents

and non-participant observation of project meetings. Notably, only notes were taken with no tape recording during non-participant observation. The data was analyzed based on qualitative analysis methods.

The construction project involved in this study was an apartment complex building in Taiwan. The total construction costs were approximately \$US 35 million dollars for 22,000 square meter floor area. The project is delivered under cost-plus percentage contract. The contractor organization obtains 12.5%

of the construction costs as its compensation. As one of the largest construction firms in Taiwan, the contractor has abundant experiences with cost-plus percentage contracts.

4. EMPIRICAL ANALYSIS

Control mechanisms used by client and contractor in construction project are examined. Table 1 summarizes those results.

Table 1 Control mechanisms identified and their actions

Control mode	Expressed problem	Actions	Executor	Control Mechanism used
Open book accounting system	Minimize the risk of double charge on invoice	Investigate invoices	Client	Formal
Budget control	Control construction cost	Setup a ceiling for total cost	Client	Formal
Allowed expense verification	Minimize the risk of over charge	Evaluation of invoices	Client	Formal
Monitor material specification	Minimize the risk of over design	Evaluation of procurement process	Client	Formal
Milestone report	Minimize the risk of over budget	Verifying work progress and any cost deviations	Client	Formal
Web camera	Monitor the work process	Verifying work progress	Client, contractor	Informal
Daily report	Monitor contractor work underway	Verifying work progress	Client	Informal
Selection of subcontractors	Minimize the risk of over	Client and contractor select	Client, contractor	Informal

	budget	subcontractors		
		together		
Trust	Nurture good	Sharing	Client,	Informal
	relationships	information	contractor	

Formal control mechanisms

Fixed-price contracts are the most commonly used contracts in construction project. Despite placing minimum administrative burden on the contracting parties, a fixed price contract subjects the contractor to the maximum risk arising from full responsibility for all cost escalations. As is well known, cost-plus percentage contract shifts a certain amount of risk from the contractor to the client, and offers little incentive for the contractor to control costs. Therefore, the client requires additional management over the construction project to ensure that only necessary costs are spent.

Open book accounting

The contractor had used SAP program as business management software. Implemented for many years, the system provides accounting information to the contractor and the client. The client could use this system to verify the quantity and amount of an invoice. The system also allows for monitoring of the performance. Both the client and contractor can monitor invoices to determine whether the construction project costs will exceed the allocated budget.

Budget control

In a cost-plus contract, a client pays all of the construction costs and takes all of the risk if the project exceeds the allocated budget. The client assumes that although it is a cost-plus contract, an upper limit should be set where the total construction costs can't exceed this amount. This action gives the contractor an incentive to help the client to control budgetary costs.

Allowed expenses

A client pays a contractor both the actual cost of a construction project and a certain percentage of construction cost as compensation for profit. A client must thus verify what construction costs entail. For instance, although steel or concrete used on-site is considered an allowed expense, poor construction resulting in overwork or redundant work cannot be considered as construction expense.

Monitoring of material specifications

The client also had a control group to monitor the material quality. This process is to intended to prevent the contractor from overspending on procurement. For instance, the contract only specified a 60x60 tile, yet did not mention whether it is made domestically or imported from abroad. This control attempts to ensure that the contractor does not purchase an imported tile because of the higher cost.

Milestone report

The role of milestone report describes progress of construction project. A client can check at any stage whether project has fallen under or exceeded budgetary costs. If exceeding budgetary costs, the client can make an adjustment if costs are over budget.

Informal control mechanisms

Web camera

The contractor voluntarily installed a web camera on the construction project site. The web camera was intended to allow both the client and contractor

management to monitor the construction process and site cleanness. A contractor offers this service to a client to show they are trustworthy and honest.

Daily report

The daily report recorded the project information, such as weather conditions, number of employees, subcontractors by name, numbers of hours worked, performance status, defects, and any delays. This report allows client to know detail information regarding events occur each day.

Selection of subcontractors

The client and contractor are involved with the procurement of a subcontractor. Contracting parties individually recommend qualified subcontractors. The client and contractor then negotiate the price with the supplier. Finally, the client decides which subcontractor to use.

Trust

Inter-organizational relationships cannot rely on a contract or control modes. A business partnership requires some form of trust for collaboration. As information asymmetries are pervasive in construction projects, sharing project information is vital to nurturing trust.

4. CONCLUSIONS

This study elucidated the role of control mechanisms in a construction project through qualitative analysis. A set of controls was identified and catalogued from a cost-plus percentage contract. Analysis results confirm that a set of control mechanisms is necessary as found in previous studies, since no business relationships are formed solely on trust (c.f. Badenfelt, 2010; Tuuli *et al.*, 2010). A set of control mechanisms is vital because the contract does not specify formal control implicitly. However, formal control is inadequate to manage a construction

project properly, explaining why informal control is complementary formal control. Effectively controlling a construction project requires that a client must learn how to balance between formal and informal control.

Empirical analysis results indicate that a very important item to control in cost-plus percentage contract is the overall cost of a project. Many mechanisms are used to ensure that contractors behave professionally in an agency theory, such as a milestone report. Moreover, subcontractors are selected to minimize the risk of exceeding budgetary costs.

This study significantly contributes to efforts to resolve agency theory related problems. The control mechanisms identified had its motivation and action. Despite its contributions, this study has certain limitations. Owing to that only a single case study was examined in this study, the lack of a sufficient number of case studies makes it impossible to verify data accuracy, thus warranting further study on similar contracts in the future.

REFERENCES

- Badenfelt, U. (2010). "I trust you, I trust you not: a longitudinal study of control mechanisms in incentive contracts." *Construction Management and Economics*, 28(3), 301 - 310. (Journal Articles)
- Das, T. K., and Teng, B.-S. (2001). "Trust, Control, and Risk in Strategic Alliances: An Integrated Framework." *Organization Studies*, 22(2), 251-283. (Journal Articles)
- Friedman, J. P. (2007). Dictionary of Business Terms, *Barron Business Dictionaries*. (Book)
- Hiller, J.R., and Tollison R.D. (1978). "Incentive

versus cost-plus contracts in defense procurement." *Journal of Industrial Economics* Vol. 26, No. 3, pp. 239-248. (Journal Articles)

Langfield-Smith, K., and Smith, D. (2003). "Management control systems and trust in outsourcing relationships." *Management Accounting Research*, 14(3), 281-307. (Journal Articles)

McAfee, R. P., and McMillan J. (1986). "Bidding for contracts: a principal-agent analysis." *The RAND Journal of Economics* Vol. 17, No. 3 (Autumn, 1986), pp. 326-338. (Journal Articles)

Muller, R., and Turner, J. (2005). "The impact of principal-agent relationship and contract type on communication between project owner and manager." *International Journal of Project Management*, 23(5), 398-403. (Journal Articles)

Rosenfeld, Y., and Geltner, D. (1991). "Cost-plus and incentive contracting: Some false benefits and inherent drawbacks." *Construction Management and Economics*, 9(5), 481-490. (Journal Articles)

Turner, J. R., and Simister, S. J. (2001). "Project contract management and a theory of organization." *International Journal of Project Management*, 19(8), 457-464. (Journal Articles)

Tuuli, M. M., Rowlinson, S., and Koh, T. Y. (2010). "Dynamics of control in construction project teams." *Construction Management and Economics*, 28(2), 189 - 202. (Journal Articles)

Yin, R. K. (2009). *Case Study Research: Design and Methods*, Sage Publications, Thousand Oaks, CA. (Book)